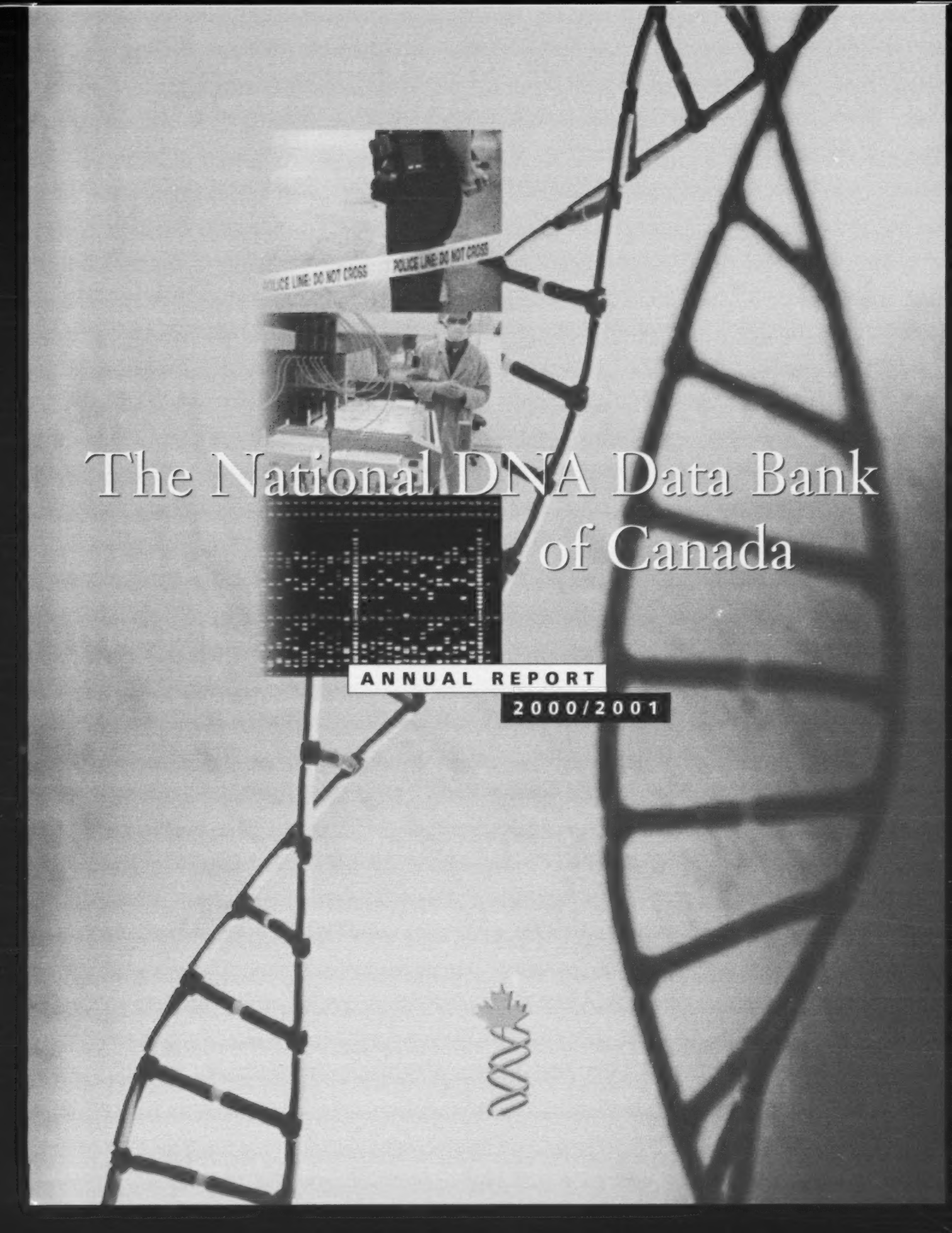


The National DNA Data Bank of Canada

ANNUAL REPORT

2000/2001

Any queries regarding the content of this report, or requests for additional copies, should be addressed to:

Officer-in-charge
National DNA Data Bank of Canada
Forensic Laboratory Services Directorate
Royal Canadian Mounted Police
P.O. Box 8885
1200 Vanier Parkway
Room 47, Laboratory Building
Ottawa, Ontario
K1G 3M8

Table of Contents

A MESSAGE FROM THE COMMISSIONER OF THE RCMP 1

EXECUTIVE SUMMARY 2

INTRODUCTION 3

- What is DNA? 3
- DNA and the Courts 3
- Creating a National DNA Data Bank 3
- The Role of the National Data Bank 4
- Cutting Edge Technology 4
- Protecting Privacy 4

THE WORKING SCIENCE 5

- Success Stories 6

PART ONE 7

- Major Milestones in the Creation of the National DNA Data Bank 7
- Scientific Research Program 7
- Scientific Technology Support Systems 7
- Sample Tracking and Control System (STaCS™) 7
- COmbined DNA Index System (CODIS) 8
- International Agreements 8
- The National DNA Data Bank of Canada Advisory Committee 8

PART TWO 9

- Building the National DNA Data Bank of Canada 9
- Chart 1: Project Costs 9
- Project Costs 10
- Performance 10
- Intellectual Property 10
- Ongoing Operations 10
- Chart 2: Implementation Costs 11
- Chart 3: Operating Costs 11

MANAGEMENT TEAM AND ORGANIZATION 12

PART THREE 13

- The National DNA Data Bank Statistics for the Year 2000-2001 13

Chart 4: Match Data 13
Chart 5: Total Profiles and Samples Received 13
Chart 6: Total Profiles Entered into CODIS 13
Chart 7: Legislative Types of Convicted Offender Samples 14
Chart 8: Convicted Offender Sample Types 14
Chart 9: Convicted Offender Types 14
Chart 10: Retroactive and Resampling Authorizations 15
Legislative Types of Convicted Offender Samples 15
Chart 11: Sample Rejections 15
Chart 12: Breakdown of Criminal Code Qualifying Offences in the Convicted Offender Index 16
Chart 13: Other Samples of Interest 16

PART FOUR 17

Innovation and Excellence 17
Future Challenges 17
Science and Technical 17
More Samples 17
Education and Awareness 17

ACKNOWLEDGEMENTS 18

APPENDIX 19

Membership of The National DNA Data Bank Advisory Committee 19
RCMP Commissioner's Representative
Richard Allan Bergman, Deputy Commissioner, RCMP (Retired) 19
Representing the Legal Profession
The Honourable Peter deCarteret Cory, Q.C. 19
Representing the Privacy Commissioner of Canada
Julien Delisle 19
Representing Population Biology
George Richard Carmody, Ph.D. 19
Representing Medical Genetics
William S. Davidson, Ph.D. 20
Representing Bio-medical Ethics
Frederick R. Bieber, Ph.D. 20
Representing Human Rights
Gisèle Côté-Harper, O.C., Q.C. 20
Officer-in-charge of the National DNA Data Bank
Ron M. Fourney, Ph.D 21

A Message from the Commissioner of the RCMP

With this report, the National DNA Data Bank of Canada marks its first full year of operation. This is an important milestone, signalling the arrival of a new era in the administration of justice in Canada.

The use of forensic DNA analysis in solving crime is proving to be as revolutionary as the introduction of fingerprint evidence in court more than a century ago. Remarkably, Canadian police have been using forensic DNA evidence for little more than a decade, yet it has emerged as one of the most powerful tools available to law enforcement agencies and the court system.

Widely regarded as a model for other countries to emulate, the National DNA Data Bank has already played a key role in helping to resolve 25 criminal cases from across the country. In one case, for example, a DNA profile was linked by National DNA Data Bank personnel to two sexual assaults in two different provinces. Police investigators in those communities are sharing evidence and information in a cooperative effort to solve the cases.

The National DNA Data Bank is a shining example of the increasing importance of science and technology in modern law enforcement. Our complex, globalized world has created a whole new set of challenges for police. To stay ahead of the criminals, we must make better use of cutting edge science, such as forensic DNA.

Police agencies everywhere must also work more closely together – building bridges, sharing intelligence and integrating operations – to strengthen our collaborative efforts to ensure safe homes and safe communities.

In the spirit of partnership, the National DNA Data Bank stands as a visible reminder of the world-class outcomes that are possible when like-minded partners come together. The National DNA Data Bank is one component of what are called the National Police Services, administered by the RCMP for the benefit of the Canadian police community. Together, they form a package of essential services that provide a rock solid foundation for police work in Canada.

The National DNA Data Bank project involved several other important partners including the Solicitor General of Canada, the Department of Justice, provincial and territorial partners, police agencies across the country, the FBI and the U.S. Department of Justice, to name just a few. To put it simply, the establishment of this world-class facility would not have been possible without the active and highly cooperative support of these diverse partner organizations.

An idea that first surfaced more than a decade ago, the National DNA Data Bank has overcome major scientific and legislative hurdles along the way. One by one, each challenge has been met successfully. The final product is a forensic tool providing key evidence in criminal cases that have exonerated the innocent and brought suspected offenders before the courts.

Canadians can be proud of the National DNA Data Bank and the certainty that its highly qualified staff will help to solve hundreds of crimes in coming years, as the scientific know-how and technological tools continue to improve.

Commissioner G. Zaccardelli
Royal Canadian Mounted Police

Executive Summary

Sometimes referred to as the blueprint of life, DNA is the fundamental building block for your entire genetic makeup. The DNA in your blood is the same as that in your skin cells, saliva, and the roots of your hair. Highly discriminating, DNA is a powerful tool for identifying individuals. Using modern technology, your DNA can be extracted from a small biological sample, such as a few drops of blood. This sample can be analyzed, creating a DNA profile that can be used to identify you.

DNA collected from a crime scene can either link a suspect to the scene, or rule the suspect out as the perpetrator. Evidence from different crime scenes can be compared to link the same perpetrator to multiple offences, whether the crimes took place locally, across the country, or halfway around the world. It can also identify a victim through DNA from close relatives.

The RCMP started doing DNA analysis in 1989 but, at this early stage, there was no central coordination at the national level that could help police take full advantage of the unfolding advances in DNA technology.

In order for this new tool to be used to its full potential, there was a need to coordinate investigations across the country. With support from all levels of government, the general public and police agencies throughout Canada, decisive steps were taken to create the National DNA Data Bank.

Confirming the Government of Canada's commitment to combat crime, especially violent crime, Bill C-3, *The DNA Identification Act* (S.C. 1998 c.37) received Royal Assent on December 10, 1998, and was proclaimed in force on June 30th, 2000. The mandate from Parliament included a requirement to have the National DNA Data Bank operational within 18 months of Royal Assent.

The budget for the design and construction project was $10.9 million including implementation, operations, maintenance and capital costs. The project came in approximately one per cent under budget.

The National DNA Data Bank is responsible for two principal indices:

1. The **Convicted Offender Index (COI)** is the electronic index that has been developed from DNA profiles collected from offenders convicted of designated primary and secondary offences identified in section 487.04 of the *Criminal Code;* and,
2. The **Crime Scene Index (CSI)** is a separate electronic index composed of DNA profiles obtained from crime scene investigations of the same designated offences addressed in the *Act.*

About 8,000 DNA samples from convicted offenders have been processed and added to the National DNA Data Bank, along with close to 2,000 samples from crime scenes. Each time DNA information from these samples is entered into the National DNA Data Bank's indices, there is a potential to unlock a key investigative lead, solve an old case, and/or link several cases together.

During its first year of operation, the National Crime Scene Index provided crucial evidence in more than 25 different police investigations across Canada. More specifically, DNA matches helped police to link:

- Multiple break and enters in one community;
- Five unrelated cases, one of which was a sexual assault;
- A robbery case with an unsolved homicide;
- Two unsolved sexual assaults from 1990 and 1992; and,
- An aggravated assault from 2000 with an unsolved sexual assault from the year before.

Every effort has been made to balance a suspect's right to privacy with the need for police officers to collect evidence. Consistent with the *DNA Identification Act*, the RCMP has imposed strict procedures governing the handling of DNA profiles and biological samples to ensure that privacy interests are protected.

A National DNA Data Bank Advisory Committee has also been established to advise the RCMP Commissioner on matters relating to the establishment and operation of the National DNA Data Bank. These matters are consistent with the requirements of the *Act* regarding privacy, legal, ethical and human rights issues.

Undoubtedly, the National DNA Data Bank will continue to play an increasingly important role in police investigations in the years to come and may very well be the final recourse in solving the oldest and often the most challenging crimes.

Introduction

What is DNA?

Deoxyribononucleic acid (DNA) is a long, double-stranded molecule that looks like a twisted rope ladder or double helix.

Sometimes referred to as the blueprint of life, DNA is the fundamental building block for your entire genetic makeup. When sperm and egg unite, equal amounts of DNA from your mother and father come together. DNA is found in virtually every tissue in the human body. The DNA in your blood is the same as the DNA in your skin cells, saliva, and the roots of your hair. Highly discriminating, DNA is a powerful tool for identifying individuals. With the exception of identical twins, each person's DNA is unique to them.

Using modern technology, your DNA can be extracted from a small biological sample, such as a few drops of blood. This sample can be analyzed, creating a DNA profile that can be used to identify you. A DNA profile, drawn from a known biological sample, can be compared to an **unknown** DNA profile drawn from a **different** biological sample. If the profiles match, the two samples come from the same person. If the profiles don't match, the samples come from different people.

The value of DNA to police investigations is enormous. Biological samples collected from a crime scene can either link a suspect to the scene, or rule the suspect out as the donor of the DNA. Evidence from different crime scenes can be compared to link the same perpetrator to multiple offences, whether the crimes took place locally, across the country, or halfway around the world. It can also identify a victim through DNA from close relatives.

The DNA molecule is very stable. This means that usable DNA can often be found on evidence that is decades old. The stability of the molecule, combined with the discriminating features of each individual's DNA and the accuracy of current DNA analysis techniques, makes DNA evidence an extremely reliable forensic tool.

DNA and the Courts

In 1983, a young woman was found murdered and sexually assaulted in a small British town. In spite of a thorough police investigation, the case could not be solved. Three years later, another young woman was murdered and sexually assaulted in a nearby community.

A suspect was eventually identified in the first case. Police sent samples of forensic evidence from both crime scenes and a sample of the suspect's blood to Dr. Alec Jeffreys, a prominent British scientist conducting research on DNA.

Dr. Jeffreys was able to give the police two critical pieces of information:

1. DNA evidence collected at both crime scenes came from the same person (thereby linking the crime scenes together and identifying a serial offender); and,
2. The suspect's DNA did not match the sample from the crime scenes (exonerating the original suspect, who had actually signed a confession!)

Blood samples were later taken from more than 4500 men in surrounding communities and a match was eventually found. One man was convicted of both violent crimes.

In 1989, DNA analysis was first used by the RCMP in an investigation where a suspect denied any involvement in a sexual assault, but the victim identified him as the attacker. DNA analysis later confirmed the victim's story. When confronted with the DNA test results in court, the suspect changed his plea to guilty.

Creating a National DNA Data Bank

The RCMP started doing DNA analysis in 1989 but, at this early stage, there was no central coordination at the national level that could help police take full advantage of the unfolding advances in DNA technology. In order for this new tool to be used to its full potential, there was a need to coordinate investigations across the country. With support from all levels of government, the general public and police agencies throughout Canada, decisive steps were taken to create the National DNA Data Bank.

Considerable consultation was carried out and included a wide range of topics. In 1996, for example, there was a presentation given across Canada regarding the future prospect of a linked DNA data base. These discussions included:

- Provinces and territories
- Police associations
- Privacy officials

- Legal associations
- Victims groups
- Women's groups
- Correctional institutions
- Forensic and genetic organizations

Confirming the Government of Canada's commitment to combat crime, especially violent crime, Bill C-3, The *DNA Identification Act* (S.C. 1998 c.37) received Royal Assent on December 10, 1998, and was proclaimed in force on June 30th, 2000. The mandate from Parliament included a requirement to have the National DNA Data Bank operational within 18 months of Royal Assent.

The Role of the National DNA Data Bank

The National DNA Data Bank assists law enforcement agencies in solving crimes by:

- Linking crimes together where there are no suspects;
- Helping to identify suspects;
- Eliminating suspects where there is no match between crime scene DNA and a DNA profile in the National DNA Data Bank; and,
- Determining whether a serial offender is involved.

The National DNA Data Bank improves the administration of justice by ensuring that those who commit serious crimes are identified more quickly across all police jurisdictions in Canada while innocent people are eliminated from suspicion.

To date, about 8,000 DNA samples from convicted offenders have been processed and added to the National DNA Data Bank, along with close to 2,000 samples from crime scenes. Thousands of police officers across Canada have been trained to collect DNA samples that are then forwarded to the National DNA Data Bank for analysis. Only a very tiny amount of blood or semen – enough to cover the head of a pin – is required to identify an individual.

Cutting Edge Technology

Canada's National DNA Data Bank relies heavily on robotic technology to dramatically speed up the processing and analysis of DNA samples. The robotics, combined with a world-class inventory and sample tracking system allows National DNA Data Bank personnel to process more samples in less time and at a significantly lower cost than other facilities around the world.

Protecting Privacy

Every effort has been made to balance a suspect's right to privacy with the need for police officers to collect evidence.

Consistent with the *DNA Identification Act*, the RCMP has imposed strict procedures governing the handling of DNA profiles and biological samples to ensure that privacy interests are protected. Information collected by the National DNA Data Bank will be used strictly for law enforcement purposes. A National DNA Data Bank Advisory Committee has also been established to advise the Commissioner of the RCMP on matters relating to the establishment and operation of the National DNA Data Bank. These matters are consistent with the requirements of the Act regarding privacy, legal, ethical and human rights issues.

The Working Science

The National DNA Data Bank is responsible for two principal indices: the Convicted Offender Index and the Crime Scene Index. These represent two different sets of samples in which the DNA profiles are developed and compared.

The **Convicted Offender Index** (COI) is the electronic index that has been developed from DNA profiles collected from offenders convicted of designated primary and secondary offences identified in section 487.04 of the *Criminal Code*.

The **Crime Scene Index** (CSI) is a separate electronic index composed of DNA profiles obtained from crime scene investigations of the same designated offences addressed in the *Act*.

DNA samples can be collected in three ways:

1. **Blood.** The sample is obtained by pricking the fingertip with a sterile lancet and collecting a blood stain on a specially prepared sample card.
2. **Buccal.** The sample is obtained by scraping the inside of the mouth with a foam applicator to obtain skin cells that are transferred to the sample card.
3. **Hair.** The sample is obtained by pulling 6-8 hairs with the root sheath attached and placing the hairs on a special sample card.

The Convicted Offender biological samples (blood, buccal or hair) are collected across Canada and are processed in Ottawa at the National DNA Data Bank into DNA profiles. These profiles are entered into "CODIS" (COmbined DNA Index System) by the National DNA Data Bank staff.

The Crime Scene Index samples are processed from biological evidence collected at crime scenes as routine forensic casework by the three public forensic laboratory systems in Canada: RCMP Forensic Laboratory Services (six sites located across Canada), Laboratoire de sciences judiciaires et de médecine légale (Montréal, Quebec) and the Centre of Forensic Sciences (Toronto, Ontario).

The National DNA Data Bank retains an electronic index of the DNA profile data from the crime scene and basic information such as date, location and a unique number identifier that allows information to be compared by the donor laboratory in the event of a future match. It is important to realize that both crime scene samples and convicted offender samples are identified simply by a unique "barcode number".

In fact, the process separates the donor identity of the convicted offender from the genetic information at the time the sample arrives at the National DNA Data Bank. A unique barcode number links the personal information to the DNA sample. This link is protected information that is not accessible by National DNA Data Bank staff and is kept by the Canadian Criminal Records Information Service (CCRIS), within the RCMP's Information and Identification Services Directorate.

The DNA profiles obtained from either convicted offender samples or crime scene samples are composed of the results of a series of nine to thirteen tests representing regions of variation (polymorphism) within the human genetic blueprint. The National DNA Data Bank utilizes the state-of-the-art PCR (polymerase chain reaction) technology to detect gender and 13 regions of genetic variation using an automated gene sequencer. This data is converted into a digital DNA typing pattern that is easy to store and compare.

It is very clear from the Act that the National DNA Data Bank profiles can only be used for law enforcement purposes. The regions of interest that forensic scientists use for profiling are considered anonymous pieces of DNA and, apart from gender discrimination, do not specify any medical, mental or physical information about the donor. The 13 core tests or "loci" chosen for forensic analysis in Canada are the same regions of genetic variation used throughout the United States and in many other countries using forensic DNA analysis.

Success Stories

During its first year of operation, the National DNA Data Bank provided crucial evidence in more than 25 police investigations across Canada. National DNA Data Bank specialists were able to link a DNA profile to more than one crime scene (which suggests a serial offender) and link known offenders to crime scenes where the perpetrator was unknown.

DNA bank links two rapes to single perpetrator

In the summer of 2000, in Ste-Foy, Quebec a woman was brutally raped. Four days later and 800 kilometers away in the Etobicoke area of Toronto, another woman was raped. The National DNA Data bank linked both cases through a DNA match developed from the evidence. Both police departments that were working independently on the two separate cases are now working together to find the perpetrator.

Globe and Mail and Toronto Star

DNA data bank links crimes in two cities

The National DNA Data Bank has enabled Winnipeg police to link two local break and enters from July 1996 and July 1997 with semen samples from a sexual assault that occurred in Alberta Beach Alberta, in November 1998.

Winnipeg Free Press

More specifically, DNA matches helped police to link:

- Multiple break and enters in a community;
- Five unrelated cases, one of which was a sexual assault;
- A robbery case with an unsolved homicide;
- Two unsolved sexual assaults from 1990 and 1992; and,
- An aggravated assault from 2000 with an unsolved sexual assault from the year before.

It is not possible to provide further detail on these cases since they remain before the courts. However, it is expected that the 2002 Annual Report will contain detailed descriptions of the role the National DNA Data Bank has played in helping police solve specific crimes.

Part One

Major Milestones in the Creation of the National DNA Data Bank

1989 – First RCMP DNA Case

1994 – Department of Justice consultations on obtaining and banking forensic DNA evidence

1995 – Amendments to the *Criminal Code*, creating the DNA warrant scheme (S.C. 1995 c.27)

1996 – Public consultation on establishing a National DNA Data Bank

1998 – Bill C-3 The *DNA Identification Act*, (S.C. 1998 c. 37) receives Royal Assent on December 10

2000 – Bill S-10, An Act to amend *The National Defence Act, The DNA Identification Act,* and the *Criminal Code,* (2000 c.10) receives Royal Assent

2000 – Proclamation of Bills C-3 and S-10 into force and official opening of the National DNA Data Bank

Scientific Research Program

DNA analysis has evolved considerably over the past decade. The creation of investigative forensic DNA data banks represents the most recent evolution of this technology. Most countries have DNA legacy systems that grew up over time and may differ from the Canadian forensic DNA typing system. The National DNA Data Bank remains flexible so that when future technologies are introduced, the resultant DNA profile data will remain consistent and compatible. Ideally, based on our current model, any new approach should share the common characteristics of providing a faster, more economical means to process DNA samples without compromising the genetic privacy and security of the sample.

Scientific research specifically for forensic applications requires diligence in validation in order to pass the high level of acceptability required by the courts and our scientific peers. As part of the Forensic Laboratory Services Directorate, the National DNA Data Bank will develop improvements in document and sample tracking and processing approaches for high volume DNA analysis.

It is expected that the long-range research objectives will include enhanced efficiencies in automated robotic processing and exploration of new DNA detection strategies enabling more sensitive and rapid identification of DNA profiles. The ultimate outcome could very well be the creation of an "active biochip" that will allow inexpensive DNA profiling with a hand-held device.

Scientific Technology Support Systems

There are two significant and mission-critical scientific technology components of the National DNA Data Bank operation. The first is the Sample Tracking and Control System (STaCS™), which tracks and provides high throughput and safeguards for the processing, integrity and privacy of DNA samples. The second is the COmbined DNA Index System, (CODIS), a software program provided at no cost to the RCMP by the FBI and U.S. Department of Justice.

Sample Tracking and Control System (STaCS™)

The Sample Tracking and Control System was designed and built to achieve the following major objectives:

- High throughput and process control for DNA samples in the National DNA Data Bank;
- Management reporting and control;
- Continuity of handling for DNA samples
- Quality assurance and control; and,
- Partial cost recovery through licensing agreements.

STaCS™ integrates instrumentation with process and ensures that advances in DNA forensic identification technology and sample tracking can be applied to large scale DNA typing and comparison in the most efficient manner. The objective of the system is to provide a mechanism for creating a database of known convicted offenders and a process by which the profile data can be formatted for entry into CODIS.

This information system tracks, controls and documents all the steps in a process that converts biological samples (blood, buccal or hair) from convicted offenders into simplified numeric DNA profiles. These can then be matched against DNA profiles generated from samples found at crime scenes. It also ensures

that the whereabouts of each sample and all of its derivatives are accounted for and provides essential data for troubleshooting the scientific process.

STaCS™ provides an important accountability record for all maintenance, sample manipulation, machine/human interface and quality assurance that is fundamental to valid and reliable DNA processing.

COmbined DNA Index System (CODIS)

The purpose of the COmbined DNA Index System (CODIS) is to create a national information repository where forensic laboratory professionals can share DNA information.

Law enforcement agencies can cross-reference their DNA information with that of other agencies across the country via a network linking the six RCMP Forensic Laboratories, two Provincial laboratories in Ontario and Quebec and the National DNA Data Bank.

This "cross-referencing" has the potential to produce DNA matches among previously unrelated cases. There are approximately a dozen countries currently using the CODIS software in their investigative forensic data banks. Another 14 countries are evaluating it as the preferred international standard format to ensure compatibility and an acceptably high level of quality assurance and security.

International Agreements

Agreements between Canada and other countries are necessary to process foreign and domestic requests for assistance in searching DNA profiles from crime scenes in unsolved cases. The system and agreements will also govern the exchange of any related criminal history or criminal investigation information that may be linked to any match between the profiles in the Canadian and foreign DNA data banks.

It should be recognized that this approach is bilateral and that the National DNA Data Bank will only request international sample searching of DNA profiles developed from Canadian crime scenes. It is anticipated that the final Ministerial approval for international DNA agreements will occur in the near future.

The National DNA Data Bank of Canada Advisory Committee

The National DNA Data Bank Advisory Committee was created through the *DNA Identification Act* on May 8, 2000. Sections 2 and 3 of the *DNA Advisory Committee Regulations* state that:

> *2. An advisory committee is hereby established, to be known as the National DNA Data Bank Advisory Committee, consisting of a Chairperson, a Vice-Chairperson, a representative of the Office of the Privacy Commissioner and up to six other members who may include representatives of the police, legal, scientific and academic communities.*
>
> *3. The members of the Advisory Committee shall be appointed by the Solicitor General of Canada for a term of not more than five years.*

The establishment of such a committee was recommended by the Standing Senate Committee on Legal and Constitutional Affairs in its *Sixteenth Report* dated December 1998. An independent advisory committee was deemed necessary to review and advise on the implementation and ongoing administration of the National DNA Data Bank.

Distinguished members of the committee include specialists in policing, science, genetics, medical ethics and the law, as well as a representative of the Privacy Commissioner of Canada and the Officer-in-Charge of the National DNA Data Bank.

Specifically, the *DNA Advisory Committee Regulations* state:

> *5. The Advisory Committee shall, on its own motion when the Advisory Committee considers it necessary or on the request of the Commissioner, advise the Commissioner on any matter related to the establishment and operation of the National DNA Data Bank that is referred to in section 3 of the* DNA Identification Act.

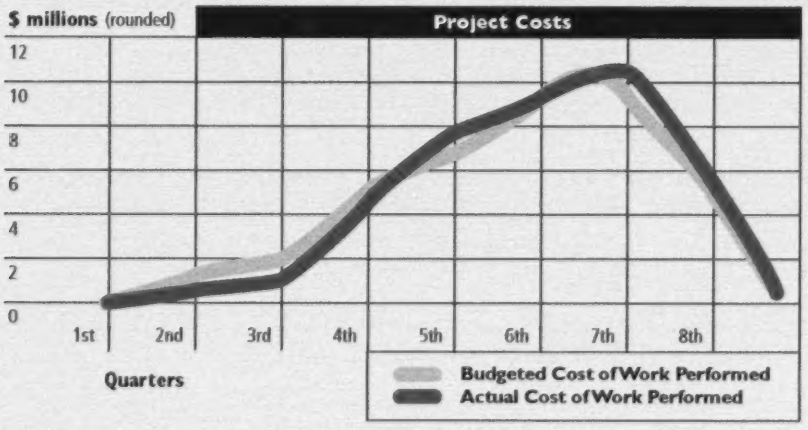
The Advisory Committee plays a pivotal role in providing advice on the privacy and legal rights of Canadians whose DNA samples are analyzed and stored in the National DNA Data Bank.

The Committee operates independently of the government and must report annually to the Commissioner of the RCMP. It has met three times since its formation in May 2000. Profiles of committee members can be found at the end of this report as **Appendix**. More information on the Advisory Committee is available on the RCMP Web Site.

Part Two

Building the National DNA Data Bank of Canada

A Project Charter for the National DNA Data Bank was prepared pursuant to Federal Cabinet authority and approved on March 27th, 1999, by the Project Leader, Dr. Brian Richardson, Assistant Commissioner of Forensic Laboratory Services. The project started on April 1st, 1999 and was completed on March 31st, 2001.



Project Costs

The project budget for the two-year period was $10.9 million including implementation, operations, maintenance and capital costs. The project came in approximately one per cent under budget.

Performance

The specific objectives of the project were articulated by the various stakeholders and confirmed by the Project Steering Committee[1].

The project objectives were:

1. To create an organization of specialists in the field of DNA forensic science capable of operating a National DNA Data Bank composed of:
   - A Convicted Offenders Index, and
   - A Crime Scene Index;
2. To create, implement and provide an accredited foundation for the appropriate protocols, methods and procedures required to ensure that DNA profile matching results are valid and reliable as well as respecting the privacy of the individual;
3. To implement the necessary support systems to ensure the long-term effectiveness and legislative compliance of the National DNA Data Bank; and,
4. To create a national storage bank of samples collected from convicted offenders as specified in the *DNA Identification Act*.

The design principles established for the project implementation phase were facilitated by the project office, derived by consensus from the entire project team and communicated to all stakeholders. These principles were then prioritized and applied in the following order on all major decisions.

1. Scientific integrity
2. Sample integrity
3. Genetic privacy
4. Production efficiency
5. Cost reduction
6. Incremental change

Intellectual Property

In today's dynamic business environment, many government departments and agencies are taking steps to identify intellectual property (IP) assets, recognize their value, and manage them as strategic levers to future innovation. This is certainly the case within the National DNA Data Bank.

From the outset, National DNA Data Bank managers have fostered a corporate culture that encourages employees to innovate and to pursue creative partnerships with both public and private sector organizations. A project as complex and science-oriented as the National DNA Data Bank created a number of very progressive and potentially lucrative intellectual assets.

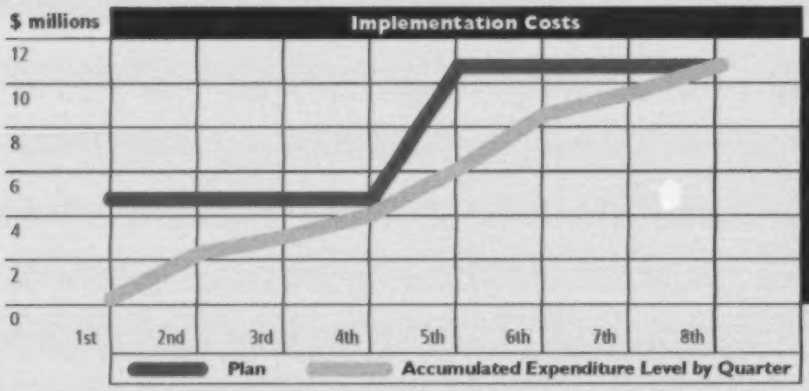
Intellectual properties are being protected to preserve their value and to provide valuable tools and knowledge to the national and international police communities. Taking advantage of IP assets is also contributing to Canadian industrial competitiveness and providing other socio-economic benefits.

Although the creation of new technologies and approaches for the National DNA Data Bank were not principal objectives, there was a clear intent to identify these assets as they were conceptualized, developed and validated. This is fully consistent with the Government of Canada's drive to protect scientific and technical innovation for the benefit of all Canadians.

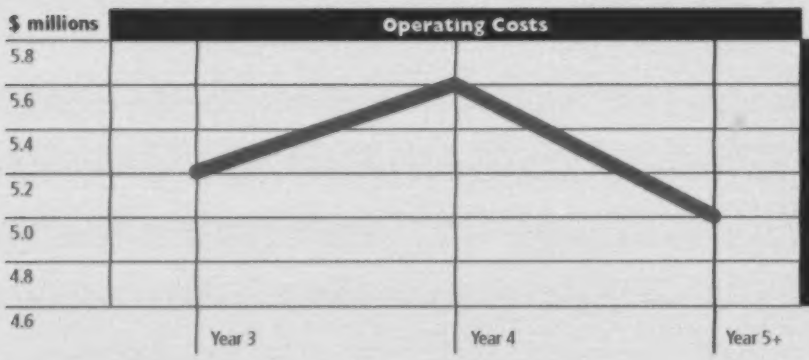
Ongoing operations

Now that the National DNA Data Bank is up and running, the project management team is turning some of its attention to preparations for the longer term. These plans are expected to be in place by early 2002 and will affect the following areas: financial management, procurement, resource management, information management, research management, performance management, report management, and business development.

[1] *National DNA Data Bank Closeout Report*

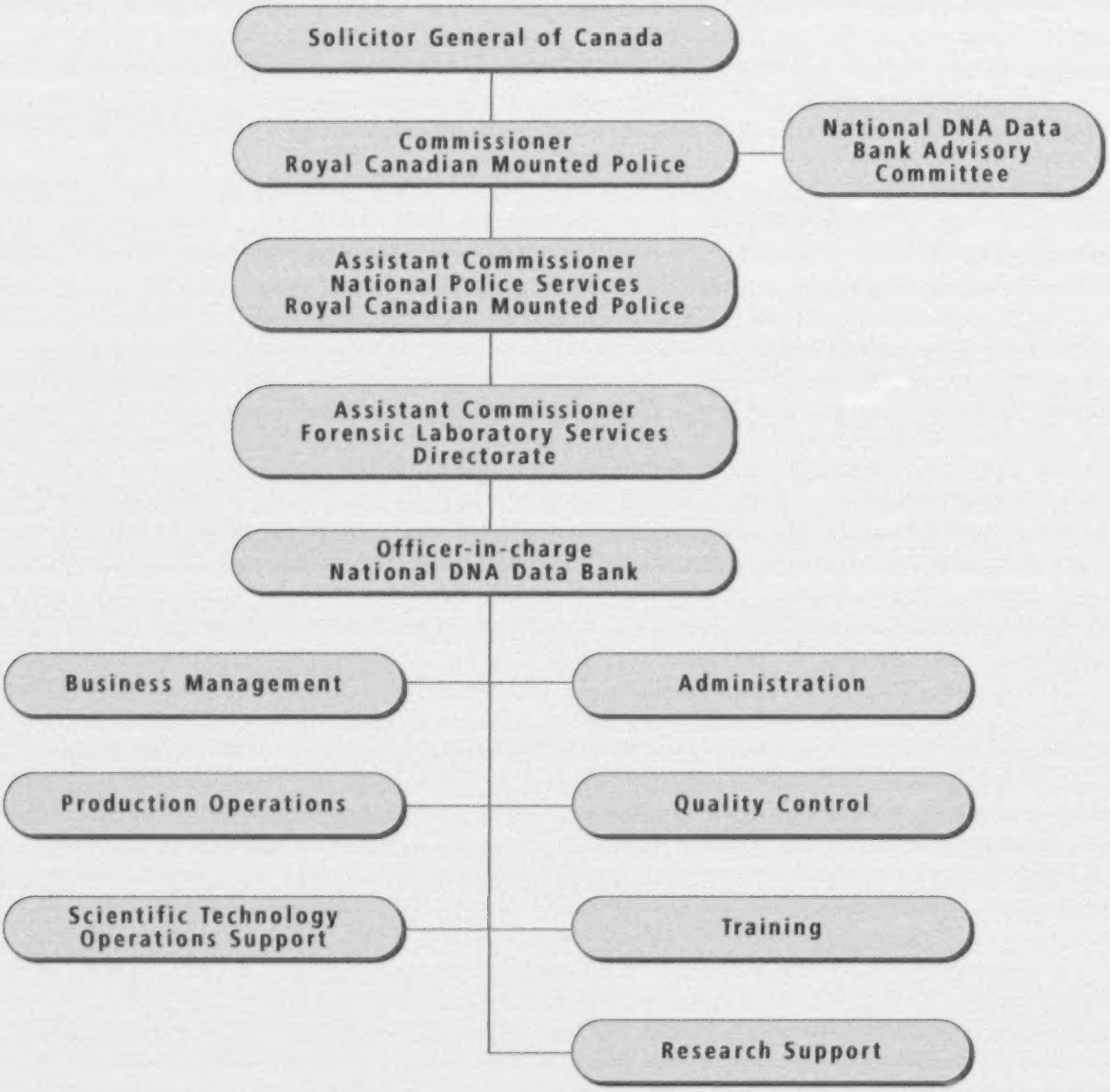


The implementation costs for the two year project include the first six months of operation and the processing of approximately 8000 samples.



The total cost of implementing and operating the National DNA Data Bank at the end of the first five year period will be $29.5 million and will stabilize at approximately $5 million per year.

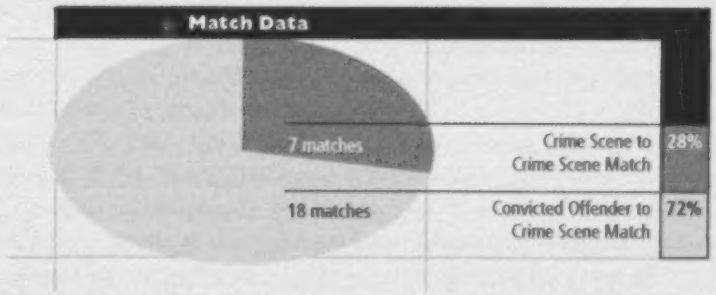
Management Team and Organization

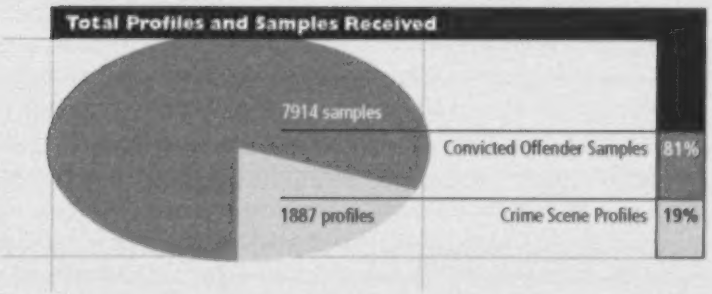


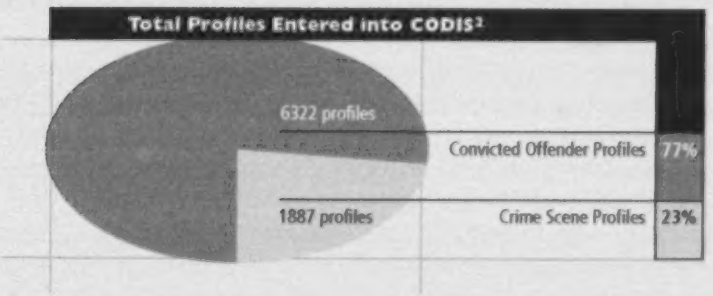
Part Three

National DNA Data Bank Statistics for the Year 2000 – 2001

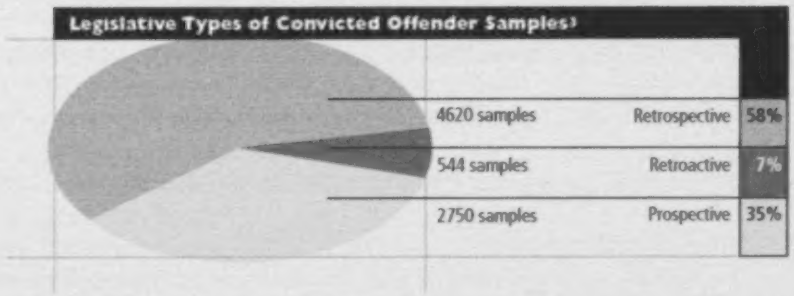
For the period of June 30th, 2000 to May 14th, 2001

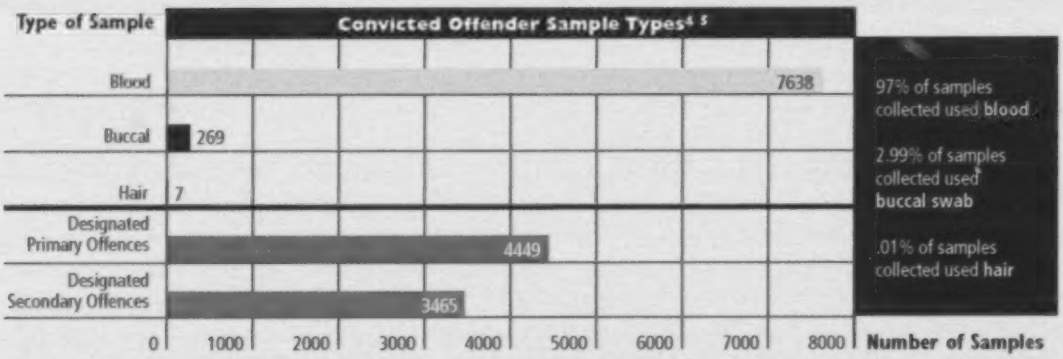




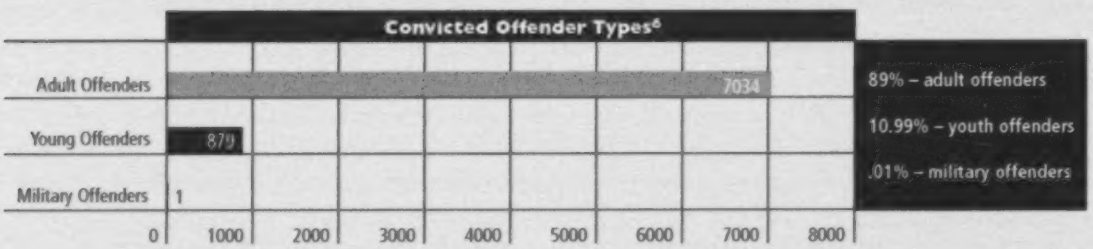


[2] ***Convicted Offender Profile:*** *a profile from an offender who was convicted of a designated offence.* ***Crime Scene Profile:*** *a profile derived from a biological substance left at the scene of a crime meeting the legislative parameters and profiles provided by a regional laboratory and kept in the local investigative data base.*





- **56% of all samples were collected from primary offenders**
- **44% of all samples were collected from secondary offenders**

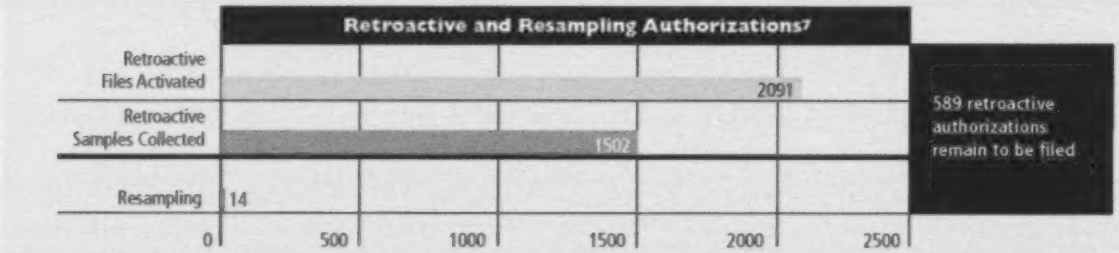


[3] *The Convicted Offender Index is a post-conviction database composed of three categories of samples.* ***Retroactive****: a sample from an offender who was found guilty of a designated* Criminal Code *offence before June 30th, 2000 and who had been declared a dangerous offender or was convicted of more than one murder committed at different times, or was convicted of more than one sexual offence, and on June 30th, 2000 was serving a sentence of at least two years for one or more of those offences.* ***Retrospective****: a sample from an offender who committed a designated* Criminal Code *offence before June 30th, 2000 and was convicted after that date.* ***Prospective****: a sample from an offender who committed and was convicted of the designated offence after June 30th, 2000.*

[4] *A blood sample is obtained by pricking the fingertip of the offender with a sterile lancet and collecting the blood stain on a specially prepared sample card. A buccal sample is obtained by scraping the inside of the mouth with a foam applicator to obtain skin cells that are transferred to a specially prepared sample card. A hair sample is obtained by pulling 6-8 hairs from the offender with the root sheath attached and placing the hairs on a special card.*

[5] *Section 487.04 of the* Criminal Code *identifies which are primary or secondary designated offences.*

[6] *An* ***adult offender*** *is 18 years or older when he/she committed the designated offence. A* ***young offender*** *is under 18 when he/she committed the offence. A* ***military offender*** *is a member of the Canadian Armed Forces and has committed one of the primary/secondary offences in 487.04 or one of the designated offences under the* National Defence Act.

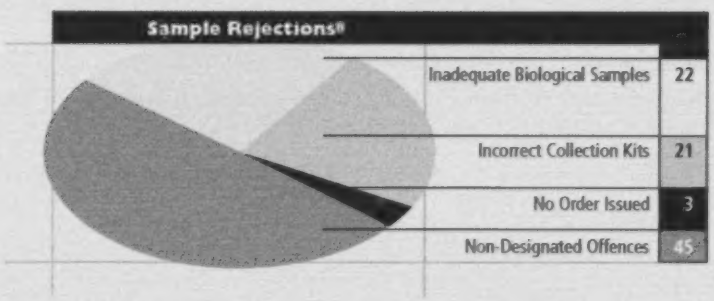


Legislative Types of Convicted Offender Samples

There was a requirement to ensure that the collection of retroactive, retrospective and prospective samples was effectively managed. To facilitate this requirement, a DNA Sample Collections Project was created and managed by the RCMP Forensic Identification Services.

The DNA Sample Collections Project involved two phases:

1. The development of plans for communication, stakeholder management, collections operations, training and the implementation of these plans. This phase was successful in standardizing the processes and in the training of appropriate agencies across the country; and,
2. The facilitation, monitoring and completion of retroactive sample collection and the issuing of regular status reports. This phase is on schedule and is expected to be completed by June 2002.

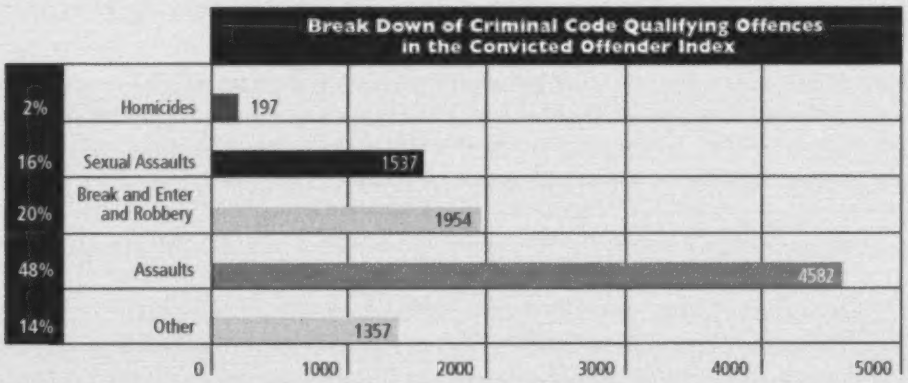


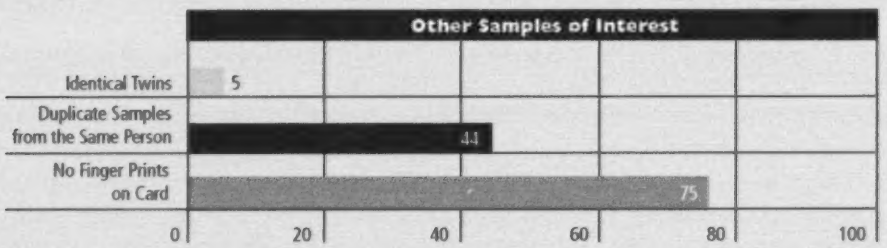
[7] Resampling occurs when the National DNA Data Bank rejects a sample and the law enforcement officer must go to a judge to ask for a re-sampling authorization (Form 5.09)

[8] Data as of May 14th, 2001.

Samples may be rejected by the National DNA Data Bank for various reasons, including:

- The sample was taken from an offender who was convicted of a non-designated offence;
- The biological sample itself was insufficient or inadequate for analysis;
- The officer took a sample and did not use an official operational DNA sample kit; or,
- There was no legal order or authorization with the biological sample.





There are five sets of DNA profiles from identical twin donors within the Convicted Offender Index. Identical twins have the same genetic profiles but are individually identified by unique fingerprints. Duplicate samples were obtained from forty-four convicted offenders. Only one DNA profile from each donor was entered into the Convicted Offender Index. Seventy-five biological sample cards were received in the National DNA Data Bank without fingerprint confirmation on the collection cards.

Part Four

Innovation and Excellence

DNA analysis has ushered in an era of unprecedented forensic excitement that rivals the introduction of fingerprints over a century ago. There are few tools in today's forensic arsenal that allow for such complete and accurate human identification. The capability of reliable and valid identification through the genetic heritage passed down from both parents may provide incriminating evidence to focus an investigation or assist in the exoneration of the wrongfully accused.

The legacy of DNA, by virtue of its simple chemical components, is characterized by the usefulness and longevity of biological evidence left at the crime scene, genetic continuity of identification regardless of the nature or tissue origin of the biological sample, and a unique discrimination ability to distinguish all but identical twins.

However, DNA also raises concerns over genetic privacy and the security of information. During the implementation and development of the National DNA Data Bank, important new approaches to provide fast and efficient processing of DNA samples were created in a manner that protects the DNA profile information and the biological samples in a secure and well-documented manner. This scientific approach respects the intent of the *DNA Identification Act* and the recommendations of the Canadian Senate Committee on Legal and Constitutional Affairs.

The National DNA Data Bank is in the business of providing a world-class investigative aid to Canadian police agencies for support of investigations where biological samples are left at the crime scene. In the process of accomplishing this goal, it has become apparent that a large portion of our technologies and processes are valued and sought after by other parties.

On behalf of the National Police Services, we are reviewing business strategies that include partnerships, alliances and licensing of intellectual properties. This is being reviewed with respect to the new standards and policies of the Government of Canada that protect and develop these innovations for the benefit of the RCMP, National Police Services and all Canadians.

Future Challenges

Science and Technical

In its first year, the National DNA Data Bank has been highly successful in providing key investigative information on serious major crimes across the country. Of course, the National DNA Data Bank will only remain relevant if it aggressively pursues new research and development opportunities. To ensure ongoing use of world-class science and technology, there must be a continued investment in capital and human resources.

More Samples

A report commissioned by the Solicitor General of Canada prior to the creation of the National DNA Data Bank estimated there were approximately 18,700 primary offences and upwards of 97,000 secondary offences that occur every year in Canada. The total number of eligible convicted offender samples that could enter the National DNA Data Bank every year would be in the range of 30,000 (not including retroactive samples). For its first year of operation, the National DNA Data Bank collected 8000 samples for the convicted offender index. That's less than one third the number originally forecasted.

As partners in the police and legal communities become more familiar with the legislative requirements, the total number of samples collected annually should rise significantly.

Education and Awareness

The Forensic Laboratory Services Directorate and Laboratoire de sciences judiciaires et de médecine légale (Montréal, Quebec) and the Centre of Forensic Sciences (Toronto, Ontario) routinely process samples from crime scenes across Canada. In the majority of these cases, it is expected that biological evidence will be associated with the most serious of offences. With today's technology, the majority of biological samples can be processed successfully and yield valuable DNA profiles.

Each time the DNA information from these samples is entered into the National DNA Data Bank's crime scene index, there is a potential to unlock a key investigative lead, solve an old case, and/or link several cases together.

Undoubtedly, the National DNA Data Bank will play an important role in police investigations and may be the final recourse in solving the oldest and often the most challenging crimes.

It is expected that in our next year of operation, there will be a significant increase in the DNA profiles entered into the National DNA Data Bank from the eligible designated offender candidates and from crime scenes. This will greatly enhance our ability to match crime scene samples with convicted offenders as well as to link unsolved crimes across Canada.

Achnowledgements

The National DNA Data Bank would like to acknowledge the contributions of the following organizations in ensuring the successful completion of the National DNA Data Bank project and the ongoing operations of the National DNA Data Bank.

- The National DNA Data Bank Staff and Project Team
- The National DNA Data Bank Project Steering Committee
- Forensic Identification Services Sample Collection Project Team
- Commissioner of the RCMP G. Zaccardelli and Commissioner Philip Murray (retired)
- John Spice, Assistant Commissioner, National Police Services and Technical Infrastructure
- Brian Richardson, Assistant Commissioner, Forensic Laboratory Directorate
- Office of the Solicitor General of Canada
- Department of Justice of Canada

Also significant to the successful implementation of the National DNA Data Bank has been – and will continue to be – the professional dedication of the men and women of the Canadian law enforcement community and our government partners across the country.

Appendix

Membership of The National DNA Data Bank Advisory Committee

RCMP Commissioner's Representative

Richard Allan Bergman, Deputy Commissioner, RCMP (Retired)

Following 35 years of distinguished service with the RCMP, Richard Bergman retired in 1997. During his career, he served in Manitoba, Saskatchewan, British Columbia, Ontario and Atlantic Canada. Among his many significant career appointments, he served as Commanding Officer of the RCMP in Manitoba; the Director, RCMP Forensic Laboratories; Deputy Commissioner, National Police Services; and, Deputy Commissioner, Atlantic Region. It was under his direction as the Director of Forensic Laboratories that the RCMP initiated its DNA program.

Mr. Bergman graduated from the University of Saskatchewan in 1972 with a B.Sc. (Honors) and with an M.Sc. (Biochemistry) in 1974. He is also a graduate of the Government of Canada's Career Assignment Program.

Mr. Bergman is a member of several professional associations and the recipient of a number of distinguished awards. He has written and co-authored a number of publications relating to legal, police and science issues.

Representing the Legal Profession

The Honourable Peter deCarteret Cory, Q.C.

After 57 years of loyal and dedicated service to Canada and its legal system, Mr. Cory retired in 1999 to take up his current position with the Osler Alternative Dispute Resolution Centre in Toronto, Ontario. Following two years of service during World War II as a Royal Canadian Air Force Bomber Pilot, Mr. Cory graduated from Osgoode Hall Law School in 1950 and served with a legal firm for a number of years before being appointed to the Supreme Court of Ontario High Court in 1974, the Ontario Court of Appeal in 1981, and the Supreme Court of Canada in 1989.

He is a member of numerous renowned associations and clubs, and is currently the Honorary Colonel of 426 Operational Training and Transport Squadron in Trenton, Ontario.

Representing the Privacy Commissioner of Canada

Julien Delisle

Mr. Delisle hails from Jonquière in the Saguenay - Lac St. Jean Region of Québec. He studied at the University of New Brunswick and at Saint-Thomas University in Fredericton, New Brunswick. He has a Bachelor of Arts degree in French Literature.

Mr. Delisle has extensive experience in the human rights field at both the provincial and federal levels. He joined the Office of the Privacy Commissioner of Canada in 1985 and has been its executive director since 1991.

Representing Population Biology

George Richard Carmody, Ph.D.

Beginning an eminent career in academia upon graduation from Columbia University with a degree in chemistry in 1960, Dr. Carmody pursued his education with a Ph.D. in Zoology from the same institution. Subsequently, he was a postdoctoral fellow in population biology at the University of Chicago, a senior fellow (genetics) at the University of Nottingham, and a visiting researcher and professor at the National Institute of Environmental Health Sciences, the University of Hawaii, and the University of Texas.

Since joining Carleton University in 1969 and becoming a Canadian citizen, Dr. Carmody has been an Assistant Professor, Associate Dean of Science, Chair, Integrated Science Studies, and is currently an Associate Professor of Biology.

Dr. Carmody is a member of a number of professional societies, has participated in the publication of a plethora of scientific documents, testified in numerous DNA related court cases in Canada, and has presented briefings at many lectures and seminars throughout North America. Dr. Carmody is recognized in the scientific and legal communities as a preeminent expert in population genetics and statistics as it is applied to forensics.

Representing Medical Genetics
William S. Davidson, Ph.D.

After graduating with a degree in biochemistry in Edinburgh, Scotland, Dr. Davidson pursued his doctorate at Queen's University in Kingston, Ontario. Following various fellowships and visiting professor appointments in the United States, he settled at Memorial University in St. John's, Newfoundland until 1999 where he advanced from assistant professor to acting Dean of Science. Thereafter, he was selected for his current position as the Dean of Science at Simon Fraser University in British Columbia.

Dr. Davidson has authored a significant number of research papers and articles, and is a member of several influential national and international groups with an active interest in medical genetics.

He supervised a number of graduate students at Memorial University, and continues to pursue this endeavor at his current assignment. Dr. Davidson has lectured widely throughout Canada and the international scientific community.

Representing Bio-medical Ethics
Frederick R. Bieber, Ph.D.

Born in Regina, Saskatchewan, and now a U.S. citizen, Dr. Bieber has a B.A. from the State University of New York, an M.Sc. from the University of Rochester School of Medicine, and his Ph.D. in human genetics from the Medical College of Virginia. Following his formal education, he completed postdoctoral fellowships in medical genetics at the Massachusetts General Hospital and Harvard Medical School and in Pathology at Brigham and Women's Hospital in Boston.

He is licensed and certified with a number of American genetics and genetics-related boards. He is currently an Associate Professor of Pathology at Harvard Medical School, a medical geneticist at Brigham and Women's Hospital, a consultant in Pediatrics at Massachusetts General Hospital, and a consultant in pathology at Children's Hospital in Boston.

Dr. Bieber is a member of the DNA Advisory Board with the Federal Bureau of Investigation and U.S. Department of Justice. He is a recipient of numerous academic and public service awards and honors for his academic achievements. On March 2, 2000, Dr. Bieber was honoured with a Distinguished Service Award by the Massachusetts District Attorney's Association for his contributions to public safety over the previous ten years.

Representing Human Rights
Gisèle Côté-Harper, O.C., Q.C.

Gisèle Côté-Harper graduated with a B.A. and an LL.L. from L'université de Laval and an LL.M. from Harvard. She is currently a Barrister and a Professor in the Faculty of Law at L'université de Laval where she teaches substantive criminal law, criminal procedure and evidence.

Professor Côté-Harper was a long-time member of the Canadian Human Rights Tribunal, of the Quebec Human Rights Commission, and the RCMP Public Complaints Commission. She also served as a member on the U.N. Human Rights Committee.

Mme. Côté-Harper has been a member of the Board of Directors of the Canadian Institute for International Peace and Security and served as a co-rapporteur on the creation of an international institute for the development of human rights and of democratic institutions. She is the Founding Chairperson of the Board of Directors of the International Centre for Human Rights and Democratic Development, a post she held for six years.

Professor Côté-Harper was appointed Queen's Counsel in 1987. In 1995, the United Nations Association of Canada recognized her contribution as a legal expert on national and international human rights issues by awarding her the Lester B. Pearson Medal. In 1998, she was named Officer of the Order of Canada and received the Quebec Bar Medal.

A distinguished author, Professor Côté-Harper now sits on the Board of Directors of the Inter-American Institute for Human Rights in Costa Rica and on the Board of Directors of the Pearson Peacekeeping Centre. She also acts as a member of the recently created International Commission on State Sovereignty and Intervention.

Officer-in-charge of the National DNA Data Bank
Ron M. Fourney, Ph.D.

Dr. Fourney is a research scientist with the Forensic Laboratory Directorate and is the Officer-in-charge of the National DNA Data Bank in Ottawa. He received his B.Sc. and M.Sc. in biology from Queen's University in Kingston, Ontario and his Ph.D. in Biochemistry at Memorial University in St. John's, Newfoundland. He conducted a year of post-doctoral studies in molecular evolution and three years of additional investigations into the molecular basis of cancer predisposition as a National Cancer Institute of Canada and Alberta Cancer Board research fellow.

Dr. Fourney joined the RCMP as a civilian member and molecular genetics specialist in 1988. He is a founding member of the RCMP DNA program and has been instrumental in the development and implementation of forensic DNA typing for Canada. He represents the RCMP on numerous national and international committees tasked with the development of DNA identification for forensic applications. He was the project director for the implementation of the National DNA Data Bank and has played key roles in numerous investigations including organization and management of the DNA task force that assisted in the identification of the victims of the Swissair Flight 111 aircraft disaster (September 1998).

Dr. Fourney is a member of the editorial boards for the Journal of BioTechniques and the Journal of Forensic Sciences, advisor to the International Journal of Legal Medicine and has a cross appointment as an adjunct professor in the Dept. of Biology at Carleton University in Ottawa.